Brebner Flat

Silviculture Report

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Introduction

This report describes the existing conditions of forest vegetation within the Brebner Flat Resource Area. Alternative treatments are described and the direct, indirect, and cumulative effects of those alternatives on forest vegetation are described and discussed. This report also summarizes the silvicultural diagnosis and identifies potential management opportunities for timber management in relation to the desired conditions under the revised Forest Plan within the Brebner Flat Project Area. Field reconnaissance and stand exam data was used to develop treatment options for the potential timber harvest units (approximately 2900 acres) identified by the Interdisciplinary Team (IDT) in preliminary planning.

The analysis in this report focuses on the existing forest species composition and structure within the analysis area. The current condition of the Forest is outside of the historic range of variability (HRV) with respect to forest species composition and structure (Forest Plan FEIS, page 94). This deviation from the HRV is the fundamental cause of existing forest health concerns that are driving the proposed actions of this project.

In order to comply with Forest Plan and other management direction, the Brebner Flat project proposes actions that change the existing forest species composition and stand structure of some stands. Additionally, the proposed actions will increase the average patch size in the project area. The need for these actions directly affects the vegetation resource.

The 1,719-acre Brebner Flat project area lies within the 1,350,000-acre St. Joe Geographic Area.

Purpose and Need

Changing Forest Vegetation to Improve Forest Health and Resiliency

Forest vegetation in the Brebner Flat project area has changed over time due to a combination of fire suppression, introduction of white pine blister rust, and past management practices. Before the stand-replacing fires of 1910 and 1926, and the subsequent focus on fire suppression, western white pine (*Pinus monticola*) was a more substantial component of the landscape. Western larch (*Larix occidentalis*) and ponderosa pine (*Pinus ponderosa*), represented a minor but frequent component of forested stands in the area.

Historically, western white pine was the dominant species across much of northern Idaho (Forest Plan, page 67). With the loss of western white pine (*Pinus monticola*), the forests of the Idaho Panhandle National Forests (IPNF) are much less productive and are unstable (Forest Plan,[1] page 68). In the past, northern Idaho produced high volumes of western white pine and other species that ranked among the best in the country (Haig et al. 1941). Other early seral species, such as western larch (*Larix occidentalis*) and ponderosa pine (*Pinus ponderosa*), experienced a precipitous decline across the landscape of northern Idaho concurrent with the loss of western white pine. The decline in western white pine and other early-seral-dominant forests has changed stand structures Forest-wide. The acres of stand structure in seedling and sapling size, as well as large diameter trees, have decreased dramatically. Stands with small- and medium-sized trees increased correspondingly.

The result of this shift in species dominance and stand structure in the forests of the IPNF has had a desultory effect on the resiliency of the forests. They have become insect-, pathogen-, and fire-prone forests that are less resilient and not as ecologically functional. (Atkins et al. 1999; Harvey et al. 1995; Monnig and Byler 1992).

[1] USDA Forest Service (2015).

Current conditions show stands dominated by grand fir (*Abies grandis)* and Douglas-fir (*Pseudotsuga menziesii)*, with some stands dominated by lodgepole pine (*Pinus contorta)*. Root diseases are found in stands throughout the project area and are associated mostly with stands dominated by true firs, western hemlock (*Tsuga heterophylla)*, and Douglas-fir. Root disease was also commonly found on lodgepole pine and was noted on Engelmann spruce (*Picea engelmannii*). Root disease was observed in every stand visited during project reconnaissance.

Today, most of the Brebner Flat landscape is composed of mature forests dominated by Douglas-fir, grand fir, and western hemlock. These species have replaced historical white pine and ponderosa pine, as well as larch. These forest stands, which historically would have had fewer of the fir and hemlock species due to wildfires, have very little structural diversity and are at higher risk of succumbing to insect and disease infestations. Larch and white pine need open sunny areas to regenerate due to their shade intolerance. Lodgepole pine stands in the project area are already infested or are considered a high risk for bark beetle attacks; a trend that is expected to continue in the near future. Mature forest stands that are close to meeting old-growth characteristics need to be retained because….

There is also a need to manage the landscape arrangement of forest structure and age class within the Brebner Flat project area. Currently, the average patch size for the seedling/sapling-size trees is below the desired condition and below historic size. This is primarily due to the lack of stand-replacing fire over the past century and the average size and pattern of contemporary timber harvests. Increasing the average patch size for the seedling/sapling-sized trees is important to regenerate the early-seral species (ponderosa pine, western larch, and western white pine), which are more resistant to disturbances.

For these reasons and as directed in and identified by the 2015 IPNF Revised Forest Plan and other management direction, we want to improve forest landscape resiliency by providing for forest composition and structure that best resists insects and disease. More specifically, we want to:

- Decrease the current levels of insect and disease (specifically root disease, dwarf mistletoe, and beetles) to increase forest health and resiliency across the project area.
- Increase the amount of western white pine and western larch while decreasing Douglas-fir and grand fir/cedar/hemlock in order to restore more historical proportions. Western white pine is greatly under-represented while grand fir/western red-cedar (*Thuja plicata)*/hemlock is greatly over-represented. Western larch is also below and Douglas-fir above desired ranges.
- Retain mature forests that have the potential to become old growth in the future.
- Create a range of patch sizes that has a diversity of successional stages, densities, and compositions. The pattern of successional stages should be such that fire or insects and diseases do not dominate the landscape at any one time.

As the Forest is managed toward the desired conditions for this biophysical setting (warm/moist), uncharacteristic levels of root disease, bark beetles, and fire intensity would decrease over time. In terms of history and resiliency, it is desirable to have an increase in the size of forest patches that are dominated by trees in the seedling/sapling-size class, and in the large-size class, while reducing the amount in the small- and medium-size classes. Including openings less than and larger than 40 acres would create a variety of patch sizes in the landscape pattern.

Topics and Issues Addressed in This Analysis

Issues

Issues for vegetation were identified by both the public and Forest Service professionals. “Key Issues” drive alternatives. “Measured Issues” are addressed through analysis to show differences between alternatives or are addressed with design features to minimize the potential effects of those issues (Table 1). Issues "Not Analyzed in Detail" were not analyzed for the reasons given.

Table 1. Issues identified during scoping for the Brebner Flat project

Issue/Suggested Alternative	Key or Measured Issue, or Not Analyzed in Detail	Issue/Suggested Alternative Addressed by?	Issue Identified by?
Timber harvest and fuels reduction are not needed because the fuels and trees have already been removed in that area.	Key	Analysis of the no-action alternative.	Public
Harvesting only a portion of the project area "16%" is not critical to the forest health of the entire area.	Measured	Analysis of the no-action alternative and action alternative; a higher percentage of treatment area is not feasible for other resource concerns or economically.	Public
Use of clumped leave trees, reserves, leave strips and irregular shaped edges in large openings to provide wildlife habitat and improve visuals.	Key	Retaining trees in clumps, strips and soft edges will be addressed in individual silvicultural prescriptions and addressed in the wildlife and visual report analysis. Many of these practices are standard Forest Service procedure.	Public

Resource Indicators and Measures

The use of resource indicators and measures is required by FS direction (FSH 1909.15, 12.5) to focus analysis and to measure and disclose effects. They are generated by the projects Purpose and Need as well as Issues identified during scoping. Measures should be understandable, quantifiable, and sensitive to change see Table 2.

Table 2. Resource indicators and measures for assessing effects

Resource Element	Resource Indicator	Measure (quantify if possible)	Used to Address: Purpose and Need, Key or Measured Issue?	Source
Species Composition	Conversion of dominant species from later to early species	Acres: Number of acres of NFS land in the project area dominated by early-seral species are closer to the HRV[1]	Yes; Used to address project purpose and need	GOAL-VEG-01 FW-DC-VEG-01 FW-DC-VEG-04 FW-DC-VEG-06 FW-OBJ-VEG-01 FW-GDL-VEG-08
Stand Structure	Stand structure closer to that of historical range of variability	Acres: Percentages of acres of NFS land in the project area in each stand structure are closer to the HRV[2]	Yes: Used to address project purpose and need	GOAL-VEG-01 FW-DC-VEG-02 FW-DC-VEG-04 FW-GDL-VEG-08
Average Patch Size	Change in average patch size across the project area	Percent change in average patch size on NFS land in the project area[3]	Yes: Used to address project purpose and need	FW-DC-VEG-05 FW-GDL-VEG-08

Old Growth	Existing and/or potential future old growth	Proportion and acres of the watershed allocated as old growth per Green et al (2011) definitions.	Yes	FW-DC-VEG-03, FW-STD-VEG-01, FW-GDL-VEG-01, FW-GDL-VEG-02

[1] Dominance will be based on percentages of basal area by species from stand exam or calculated by FVS.
[2] Stand structure will be based on stand exam.
[3] Patch size change will be calculated using patch size acres from the IPNF GIS vegetation layer.

Resource Element, Indicator and Measure 1: Species Composition

The first resource element and indicator is measured by the number of acres converted from being dominated by later-seral species to being dominated by early-seral species. Species dominance is calculated by the percentage of square feet of basal area for each of the early- and late-seral species groups. Figure 1 shows the current higher percentages of later-seral species at the Forest-wide level compared to the historic range of variability called for by management direction.

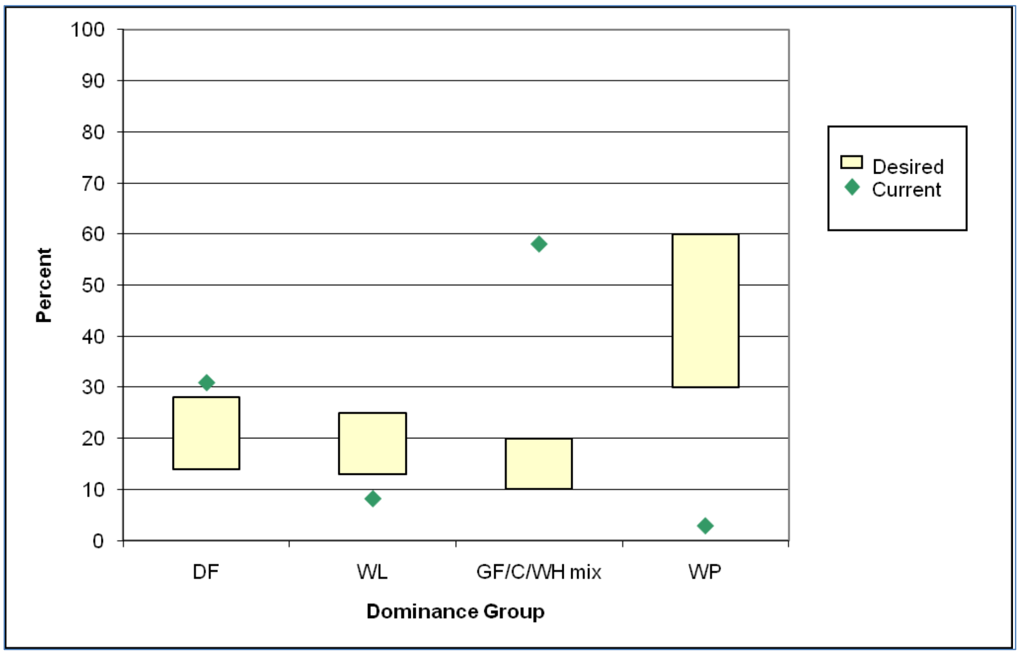

Figure 1. Desired (historic range) and current Forest-wide composition by dominance group for the warm/moist biophysical setting (Forest Plan FEIS, page 94)

Effects to species composition will be calculated using number of acres where the preponderance of basal area has been changed from late- to early-seral species dominance groups. This calculation will be analyzed for the planning window of 80 to 90 years.

Resource Element, Indicator and Measure 2: Stand Structure

The second resource element and indicator measured is stand structure. The Forest Plan FEIS uses size class as a surrogate for structure. Existing size classes for the proposed treatment units and within the project area have been calculated by stand exam and then compared against the historic range of variability for those stand structures. This analysis indicates existing stand structure is skewed away from the HRV at the Forest-wide level (figure 2).

Management direction from table 2 directs us to increase the acres of seedling/sapling and large-diameter structural classes and to simultaneously decrease the number of acres in the small- and medium-stand structure. This will help bring the future Forest structural stage percentages[2] into a closer resemblance of the desired structural stage percentages in figure 2.

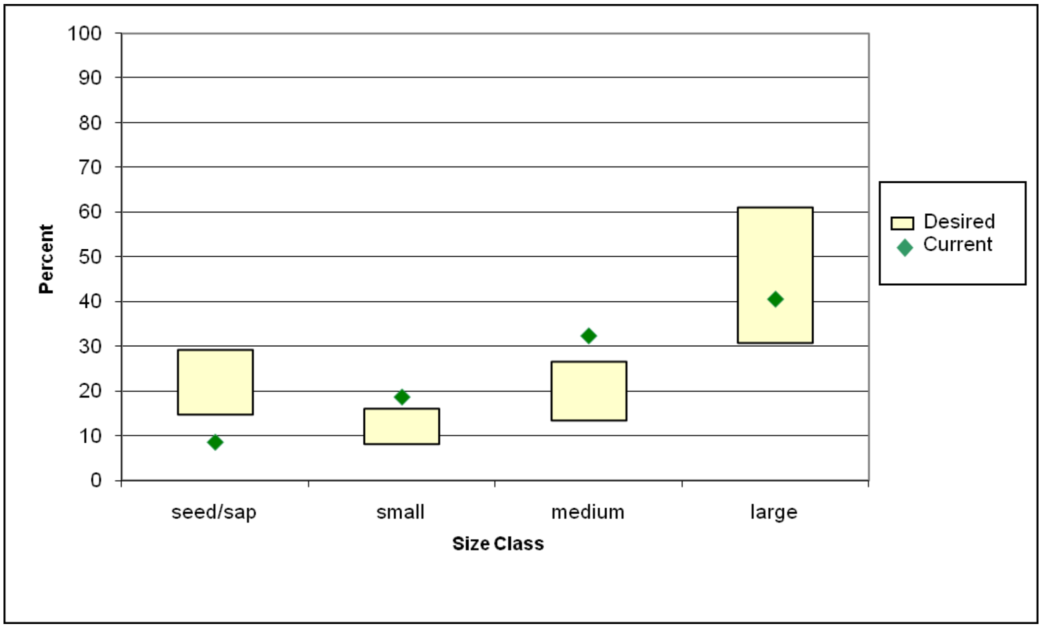

Figure 2. Desired (historic range) and current Forest-wide structure by size class for the warm/moist biophysical setting (FEIS, page 95)

Effects to stand structure were calculated using number of acres where stand structure has been changed from small or medium back to the seed/sap-structural stage. This calculation was analyzed only for post treatment because trees continue to grow and the treated stands will have grown back into the small- and then medium-size classes within 20 years.

Resource Element, Indicator and Measure 3: Average Patch Size

Forest Plan direction aims to increase the average patch size across the Forest. Current average patch size is analyzed at approximately 31.6 acres for the project area. Treating areas larger than the current average will increase the average patch size across the project area. Since patch size is a static number, it will only be calculated immediately post treatment. Average patch size could change post-treatment but this would only be due to unforeseeable events such as widespread insect mortality or some other physical disturbance such as wind damage or wildfire.

Methodology

FVS Modeling

The effects of the proposed action on timbered stands in the project area were modeled using the Forest Vegetation Simulator (FVS) software; North Idaho Inland Empire regional variant revised 09/30/14. The specific attributes for each of the measures were calculated from stand exam data taken in 2012 and 2013. These stand exams were completed using Forest Service Common Stand Exam protocols.

From the stand exam data, several stand attributes were calculated for this report. Species dominance changes were calculated using percentage of basal area for individual species pre- and post-treatment.

[2] As tracked by the green diamonds in figure 2.

Stand structure was calculated using FVS stand structure report output by individual treatment units. Changes in average patch size were calculated using ArcMap, a geographic information system.

These attributes were modeled for the present, post-treatment, and into the future. In addition to basal area and stand structure, several other stand attributes associated with the fuels and wildlife resources were calculated. These attributes included fuel loading, canopy cover, canopy base height, and canopy bulk density. All outputs from the FVS and GIS modelling are located in the project record.

Forest stands proposed for treatment were reviewed by Forest Service pathologists, entomologists, and certified silviculturists for current insect and disease activity, species composition, and stand structure. Areas unsuitable for timber production were not considered for treatment related to timber production. In addition to field reconnaissance, determining reforestation potential involved review of the reforestation indices for the District and the project area (located in the project file). These indices display our ability to regenerate stands in the project area proposed for regeneration harvest within 5 years as required under NFMA and the Knutson-Vandenberg Act (16 USC 576b).

Information Sources

This analysis uses data collected during stand examinations on all proposed treatment units using Forest Service Region 1 protocols. Data and information were also collected during field visits by the project silviculturist and ID team. Other information, such as stand acres, was derived from the IPNF's GIS database.

Biophysical Setting Size and Structural Classes

In the IPNF Forest Plan, size class was used as a proxy for describing vegetation structure. Size class can be cross-walked to stand age and structure. Size classes were chosen based on historic and existing data classifications, the ability to crosswalk the data to common classes, and information needed for modeling (Forest Plan FEIS). The following size classes were used for each biophysical group:

- Seedling/sapling (0 to 5 inch DBH)
- Small (5 to 10 inch DBH)
- Medium (10 to 15 inch DBH)
- Large (greater than 15 inch DBH)

Incomplete and Unavailable Information

There are no stand examinations recorded in FSVeg on approximately 29 percent of the project area. Some of the stands within that unexamined area are seedling/sapling-size class stands that resulted from harvest activities in the early 2000s. The size class of these young stands was determined by visual observation and through a review of the reforestation stocking surveys. Unexamined stands were assigned structure classes and forest cover types based on visual comparisons with stands that had been examined.

The timber suitability layer (project record) identifies portions[3] of Unit 19b_2 as unsuitable for timber production. The portion of 19b_2 was categorized as unsuitable because it was identified as part of an RHCA buffer. However, it has been field verified that there is no water in that upper portion of the slope. It is therefore out of the actual RHCA buffer and should be suitable for timber production.

[3] Stand ID 01040248010029 -3.9 acres

Spatial and Temporal Context for Effects Analysis

Spatial and temporal boundaries set the limits for selecting the actions most likely to contribute to cumulative effects (FSH 1909.15, 15.2).

The spatial boundaries for analyzing the direct, indirect, and cumulative effects to stand density as measured by basal area and stand structure are the individual treatment units. This is appropriate because basal area and stand structure are fixed to the treatment unit. The spatial boundary for analyzing average patch size is the project area. This is appropriate since average patch size is calculated using all of the stands in the project area.

The temporal scale of the analysis is approximately 80 to 90 years. Effects to vegetation can be modeled for longer time frames but confidence in the modeled outputs decline substantially beyond 100 years primarily due to accumulation of assumptions and unknowns. Unknowns may include occurrences of insect outbreaks, fires, natural regeneration densities and compositions, and storms. Because these are unknowns, assumptions must be made about whether they occur or not, their magnitude and severity if they occur, and other factors. As simulation lengths increase, the burden of assumptions and unknowns increase. Temporal scope for size class and average patch size is immediately after treatment.

Affected Environment

Biophysical Setting

To characterize the existing, historical, and desired forest vegetation across the IPNF, three biophysical settings were recognized: Warm/Dry; Warm/Moist; and Subalpine. Areas within each of the biophysical settings have similar patterns in potential natural communities, soils, hydrologic function, landform and topography, lithology, climate, and natural processes (e.g., nutrient and biomass cycling, succession, productivity, and fire regimes). The project area falls within either the Warm/Dry, Warm/Moist or Subalpine biophysical setting areas. The FEIS for the IPNF describes these settings as:

> **Warm/Dry:** This biophysical setting includes the warmest and driest sites that support forest vegetation. This area is primarily dominated by ponderosa pine, Douglas-fir, lodgepole pine and western larch. These sites cover approximately 15 percent of IPNF NFS lands and occur either at low elevations, at mid-elevations on southerly aspects, or on droughty soils.
>
> **Warm/Moist:** This biophysical setting includes moist sites that are relatively warm and these sites cover approximately 61 percent of IPNF NFS forested lands. This area is diverse and dominated by western white pine, western larch, Douglas-fir and grand fir/cedar/western hemlock mix. This setting includes low-elevation upland sites with deeper soils on north and east aspects, extensive mid-elevation moist upland sites, most low- and mid-elevation wet stream bottoms and riparian benches and toe-slopes.
>
> **Subalpine:** This biophysical setting occupies the higher elevations of the forest. This setting ranges from the cool and moist lower subalpine sites, up to the cold and dry high elevation sites that have more open forests. These sites cover approximately 24 percent of the IPNF NFS lands and are primarily dominated by subalpine fir, lodgepole pine, mountain hemlock and Engelmann spruce.

A GIS analysis of the Biophysical Settings within the project area indicates that approximately 85 percent of the timbered stands in the project area are in the Warm/Moist biophysical setting, 11 percent are categorized in the Warm/Dry setting and the remaining 4 percent are categorized in the Subalpine setting.

Historic and Existing Conditions

Historically in the project area, like much of northern Idaho, stands dominated by western white pine and western larch were common. Western white pine was considered to have served as a “keystone” species in forests within this area. As discussed in detail by Mills and Soule' (1993), a keystone species is one whose loss leads to significant changes in ecosystem structure, materials, and energy flows.

The initial cause of the decline of the western white pine-dominated forests of Idaho was the introduction of *Cronartium ribicola* or "blister rust" from Europe in the early 1900s (Samman et al. 2003). North American white pines and other five needle pines had very little resistance to blister rust and, as such, were either killed outright by the blister rust or severely weakened by it. Weakened trees are susceptible to other disturbance agents such as insects and disease. Because of the blister rust disease, the mountain pine beetle outbreak in the western white pine in the late 1930s, and subsequent logging to capture expected morality from the disease, very little of the western white pine remains. Therefore, this tree's ecological role as a keystone species has been altered (McDonald and Hoff. 2001).

Most of the project landscape was affected by a stand-replacing fire event in 1910. Since then, many decades of effective fire suppression, other management activities (such as timber harvest), and diseases (such as white pine blister rust and root disease), have changed forest development across this landscape—resulting in dense stands comprised mainly of disease prone and drought-intolerant, late-seral species such as grand fir and Douglas-fir. Early-seral species of western larch, western white pine, and ponderosa pine are now only a minor component within stands and across the landscape. Overall, there has been a homogenization and simplification of the landscape. Without active management to regenerate early-seral species, the landscape will continue to be dominated by dense late-seral forests that are highly susceptible to root diseases.

Throughout 2013 and 2014, silviculturists and foresters walked through stands in the project area to assess the severity and types of insects and diseases impacting the stands, as well as assess hazardous fuels and other resource conditions. In August 2014, a Forest pathologist and Forest entomologist from the Coeur d'Alene Field Office of the USDA Forest Service Northern Region Forest Health Protection Group visited the project area to observe and document the Forest health conditions (USDA 2014). Based on their findings and the stand assessments conducted by the Forest, the following conclusions were made.

Root diseases are currently killing numerous trees and otherwise impacting many of the forest stands in the project area. *Armillaria*, *annosus*, and laminated root disease fungi are killing a substantial amount of the grand fir and Douglas-fir trees. Due to various factors, the forest in the project area contains more susceptible tree species, such as the grand fir and Douglas-fir, than they did historically; and less of the tree species, such as the ponderosa pine, western larch, western red-cedar and western white pine, that are less susceptible to being infected and killed by those root diseases. The tree mortality that is occurring as a result of those fungi is increasing the hazardous fuels in the project area, as well as decreasing the productivity of the forests.

Bark beetles, such as the fir engraver beetle and the Douglas-fir bark beetle, are also killing substantial amounts of grand fir and Douglas-fir trees. Often, these beetles are killing or "finishing off" trees that are already infected and weakened by the root diseases noted above. However, in other instances, it appears that the overall population of these beetles is high enough to successfully attack and kill trees that have not been weakened by the root diseases. The fir engraver beetles often kill grand fir trees that are under moisture stress from a drought or are otherwise growing on fairly dry sites, and therefore, the soil moisture levels is fairly low during the summer period. Tree mortality from the bark beetles is elevating the hazardous fuels in numerous stands in the project area as well as decreasing the productivity of the stands. Because the forest in the project area contains more grand fir and Douglas-fir trees than historically, these bark beetle species are impacting the stands to a greater degree than they likely did historically.

Other insects and diseases, such as larch dwarf mistletoe, mountain pine beetle, *schwienitzii*, and Indian paint fungus, are having impacts on the health of the forest stands in the project area. In some stands these other insects and diseases may occur at levels that may be "natural", while in other stands they may be elevated beyond normal conditions because the species composition of the trees in the stands has shifted away from species that are generally less susceptible to these insects and diseases and towards the species that are more susceptible.

Species Composition

When compared to the historical condition, the IPNF's St. Joe Geographic Assessment of 1997 found that the St. Joe Geographic Area has experienced a major decline in forest stand compositions dominated by early-seral dominant species—particularly western white pine, western larch, and ponderosa pine. These conditions are commensurate with the conditions found in the project area and well representative

It also found that there has been a corresponding increase in the shorter-lived late seral grand fir, western hemlock, and Douglas-fir. Table 3 illustrates how while the early seral species western white pine, western larch, and ponderosa pine used to make up approximately 45 percent of the St. Joe Geographic Area, they now only comprise 10 percent. Historically, the later-seral grand fir, western larch, and western hemlock used to cumulatively cover approximately 19 percent of the geographic area, now, stands dominated by these species make up roughly 55 percent of the area. Likewise, lodgepole pine-dominated acres have roughly doubled in the geographic area and 50 percent in the project area from the historic to the present condition.

This his trend holds true for all early seral species the project area. Existing percentages of the project area dominated by early- versus later-seral species can be seen in Table 3. Historically, western white pine should have dominated much of the project area. Today, white pine dominated stands are virtually non-existent in the project area besides some previously harvested stands in which it was planted. The existing situation for western larch-dominated stands in the project area is essentially the same; no mature stands dominated by western larch have been found in the project area.

As is clearly demonstrated in Table 3, there has been a shift from stands that are dominated by early-seral species to those dominated by later-seral species.

Table 3. Changes in species composition: historic versus existing, in the St. Joe Geographic Area and the project area[1]

Dominance Group Composition	White Pine	Western Larch	Ponderosa Pine	Grand Fir/Western Hemlock/ Western Red Cedar	Douglas Fir	Lodgepole Pine	Subalpine Fir Mix
Historic DG percentages for the geographic area	24.1%	16.7%	4.3%	9.7%	9.4%	7.1%	28.7%
Existing DG percentages for the geographic area	2.2%	4.8%	2.9%	32.6%	22.3%	14.4%	20.8%

Existing DGs percentages and [acres] for the project area[2]	N/A[3] [NA]	N/A[3] [NA]	0.4% [22]	65.8% [3,326]	7.3% [368]	24.2% [1,221]	2.2% [111]

[1] Data for Geographic Area Percentages was derived from the USDA 1997: An Assessment for the St. Joe Area (page 46).
[2] Data for Project Area Percentages was derived from stand exam data.
[3] None of the existing stands in the project area are considered western white pine or western larch-dominated.

Stand Structure

Figure 2 data from the new IPNF Forest Plan, the IPNF's St. Joe Geographic Assessment of 1997, and stand exam collected in the project area found that when compared to the average historical situation, the Forest, the St. Joe Geographic Area, and the project area have all experienced a decrease in large-diameter trees, large snags, large coarse woody debris, and stands dominated by older, larger, early-successional trees. These data sources have also found that there has been a decrease in younger stands with an open overstory of older, larger, early-seral trees across all of these geographic areas. The areas of small- and medium-sized trees has increased and become more uniformly dense than prior to fire suppression and other human management actions. Table 4 illustrates the existing forest structure by size class and the existing acres percentage by size class.

No treatments are proposed in old growth.

Table 4. Historic Forest-wide percentage range, existing acres, and percentages for the geographic and project area by structural size class[1]

Forest Structure by Size Class	Seed/Sapling	Small	Medium	Large
Historic Forest-wide size-class range	15–30%	8–16%	13–26%	30–61%
Existing geographic area size-class percent	26%	38%	25%	11%
Existing project area size-class percent and [acres]	N/A% [N/A]	5.8% [295]	70.5% [3,557]	23.7% [1,197]

Patch Size

Historically, fire was the primary disturbance agent throughout most Rocky Mountain ecosystems (Peet 2000), but insects and pathogens were also important. Major fire years occur most commonly during regional summer droughts. Lightning storms and wind contribute to the likelihood of a major fire year. During major fire years, stand-replacing fires were commonly tens of thousands of acres, with some individual fire patches 50,000 acres or larger (USDA Forest Service 1997; Zack and Morgan 1994).

Suppression of fire and other current management practices, e.g., logging using a regeneration harvest prescription, have created a fragmented forest landscape. The size of these regeneration harvest units (2 to 40 acres) is much smaller than patches created by historic, natural-fire regimes (Forest Plan, page 62). The existing average patch size for the project area is displayed in Table 5. The current largest patch size, 83 acres, is much smaller than the historic large patch size.

Table 5. Patch size range and averages for the project area

Number of Stands	Stand Range	Average Stand
113	3.5-83 acres	15.2 acres

Desired Condition

The maintenance of healthy, sustainable forest ecosystems requires that species and structures be adapted and resilient to disturbances such as insects and disease, fire, and climatic variability. The existing late-seral species that occupy the units proposed for treatment are not as adapted and resilient to disturbances on these specific sites as earlier-seral species.

Relative to existing forest conditions, it is desirable for stands to contain more western white pine, western larch, and vigorous ponderosa pine; and less grand fir and other late-seral species (Forest Plan 2014; Samman et al. 2003). It is desirable for acre percentages of all tree species and structural groups to be within the HRV ranges (be within the HRV ranges (figure 1 and figure 2). These vegetation conditions would be similar to those that occurred prior to European settlement and the introduction of white pine blister rust. White pine cover types once occupied 24 percent of forestland in the St. Joe River Geographic Area of (USDA Forest Service 1997). Two percent of the geographic area and less than 1 percent of the Brebner Flat planning area are currently classified as white pine forest type. Clearly, the desired future condition includes developing white pine into a more prevalent forest type component. Similarly, the larch and ponderosa pine cover types once occupied approximately 21 percent of the GA. These two cover type now occupy only 8 percent of basin. In the project area no stands are considered western white pine or western larch-dominated and less than 1 percent are classified as ponderosa pine stands. It would also be desirable to increase the preponderance of healthy larch, white pine and ponderosa in the area (Forest Plan 2015).

Specific direction for the desired condition can be found in the Forest Plan and is discussed in the "Regulatory Framework" portion of this report as to how the proposed action helps to meet or further the trend towards those desired conditions.

Environmental Consequences

Vegetation Management

Across a project area of approximately 11,779 acres we are proposing:

- Timber harvest followed by prescribed burning and planting on 1,719 acres to convert stands to more resilient species.

Timber Harvest and Planting

We are proposing regeneration harvest treatments on about 1,719 acres, where the more resilient and/or longer-lived tree species, such as western larch, western white pine, or ponderosa pine, are a minor component in the stand. Walk-throughs of the proposed treatment areas by certified silviculturists demonstrated that like most of the watershed, these areas were once dominated by more root disease and fire-resilient species (western white pine, western larch, and ponderosa pine). For a variety of reasons, over time, these early-seral, root-disease-resistant species have been replaced by later-seral individuals. Removing the later-seral, less-resilient trees (grand fir, Douglas-fir, and lodgepole pine) would result in the removal of most of the trees (overstory). We would follow up by burning slash then planting these sites with more resilient tree seedlings to add to the natural regeneration.

This prescription is designed to encourage the growth and regeneration of white pine and larch by cutting most of the trees in each unit, except those needed for wildlife snag habitat and coarse woody debris recruitment. Due to the extent of root disease and insect infestation throughout the stands in the project area, this is the only prescription we are proposing for timber harvest for this project. Pervasive root rot and insect damage through all stands in the proposed harvest units would not lead to healthy stand conditions if thinning treatments or other intermediate treatments were pursued. This is because the existing tree species are susceptible to root disease, and thinning accelerates the spread of root disease when those species are left. Intermediate harvest would exacerbate root disease effects (through buildup in the stumps and root systems of the fungi that cause root disease), lead to heavy blowdown, and encourage advanced regeneration of grand fir and Douglas-fir.

As noted in the forest health report from August 2013, anything but regeneration harvest in the Douglas-fir and grand fir stands and in the lodgepole pine stands would result in conditions where the remaining trees in the stand continue to experience mortality due to remaining root rot and infestations of insects. Specifically, the field report produced after the visit by the Forest health staff predicted that "The end result of a "do-nothing" approach or thinning harvest will likely perpetuate multi-aged canopies of mostly root-disease susceptible species, or in some locations, create brush fields."

In order to promote conditions that move toward the desired condition of resilient and healthy stands, we are proposing to remove most of the trees in treatment units which will result in openings larger than 40 acres in most of the proposed harvest units. These larger openings are needed in order to apply the silvicultural prescription recommended by the project silviculturist and Forest health protection personnel. Leaving patches of Douglas-fir, grand fir, and lodgepole pine would lead to further deterioration of the remaining stands. As described in the initial silviculture report and the Forest health protection trip report, root disease is found in every stand in the project area. Since most of the stands are dominated by Douglas-fir and grand fir, which are inherently more susceptible to root diseases than western white pine or western larch, intermediate harvests are an untenable option. If intermediate harvest methods were applied in the project area to limit opening sizes, stand conditions would continue to deteriorate. Treating all the proposed areas at this time would allow us to store the road system for decades. If we leave some areas untreated to keep treatment units smaller, we would need to open roads and re-enter the area sooner to promote more resilient forest conditions.

Treated areas would vary in appearance from very open in clear cuts with an average of 5 to 10 trees per acre to as many as 30 trees per acre in shelterwood cuts. Within "reserves" or tree retention groups they should be denser toward the bottoms of units becoming more widely spaced with fewer leave trees toward the tops of units. The reserve trees left on site would be comprised of western white pine, western larch, and ponderosa pine where they currently exist. Other existing tree species would also be left to obtain the needed snag recruitment trees for wildlife and soil productivity. Reserve trees would provide seed to supplement the planned plantings, future snags, some ground shading, wildlife habitat, and coarse woody debris for soil productivity.

After timber harvest, prescribed fire will be used to treat slash created during logging and prepare sites for planting. Following the prescribed burning, these areas will be planted with improved blister-rust-resistant western white pine, western larch and ponderosa pine. Specific areas, numbers, and species composition of seedlings for replanting will be decided when final site-specific stand prescriptions are written.

Reforestation of the created openings within 5 years of treatment is required by the National Forest Management Act (NFMA) of 1976. Based on previous regeneration success, we can assure that treatment units would be restocked within five years of harvest. A synopsis of the planting success on the St. Joe Ranger District is contained in the project record. Documents located in the project file display the results of recent reforestation efforts and demonstrate our ability to regenerate the stands in the project area proposed for regeneration harvest within 5 years.

Opening Sizes

The openings created by the proposed harvest activities would be greater than 40 acres. As shown in table 6, the proposed regeneration units in alternative B are grouped in ten main clusters (see map in appendix B). The groups of units will have areas of retention, riparian, and other reserve areas, to break up the opening continuity. This will prevent development of larger contiguous openings.

Forest Service policy (FSM 2471.1) directs land managers to normally limit the size of harvest openings created by even-aged harvesting methods to 40 acres or less. However, exceptions to the 40-acre opening limitation are allowable with Regional Forester approval. The proposed harvesting in alternative B would create up to nine openings (table 6) in excess of 40 acres.

Table 6. Proposed openings that would exceed 40 acres

Large Group Opening Number[1]	Gross Estimated Opening Acres[2]	Proposed Unit Numbers in Group
Block 1	635	19b_2, 19b_3, 19c, 22a, 22b, 29a_1, 29b_7, 34a, 34b, 35a, 36a, 37b_2, 41b
Block 2	91	23a, 23b, 38c
Block 3	57	14b
Block 4	46	30a, 30b_1, 30b_2
Block 5	51	21a, 21b
Block 6	42	20a, 20b_1, 20b_2
Block 7	44	8a, 8b_1, 8b_2
Block 8	333	13a, 13b_1, 13b_2, 13c
Block 9	44	29a_3, 29b_6, 29c
Total	1,343	

1. See map in appendix B for reference of group locations.
2. These acre amounts include reserve areas within group openings; e.g. riparian areas, which will not be treated.

Exact acreages of the openings are not known at this time because the final shape and arrangement of aggregated retention patches will be determined by fine scale, site-specific conditions that will guide layout of the retention patches as described in the proposed harvest prescriptions.

Alternative A – No Action

This alternative would result in no activity at this time. Existing conditions, which are inconsistent with the desired conditions for this area, would remain unchanged by management action. The effects of this alternative are measured against those of the proposed action (alternative B).

Forest Composition

Barring a stand-replacing fire or disease incident, the execution of the no-action alternative would result in slow, but perceptible, changes to the existing forest composition and structure. The disparity between existing and desired conditions (table 7) would continue and would increase if no action is taken. Without management of the current disease and insect activity, some of the existing stands classified as western white pine would transition from white pine-, larch-, lodgepole-, and ponderosa pine-dominated stands to being dominated by the grand fir forest types (Cooper et al. 1987). This would cause the early-seral cover type to fall even further below desired conditions, while the grand fir/cedar/western hemlock mix would increase even further above the historical range of variation and desired conditions set forth in the 2015 Revised Forest Plan.

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Forest Structure

Under the no-action alternative, there would be no proposed activities to change forest structure, so differences between the existing and desired conditions would persist (table 7). As stands continue to grow over the next 10 to 20 years, the acreage of seedling/sapling-size and small-size classes would decrease as these stands grow into the medium class. Some of the stands in the large-size class would regress to the medium-size class due to mortality caused by root diseases and insects in Douglas-fir and grand fir. On grand fir habitat types, persistent root disease may result in stagnated stand development because many regenerating Douglas-fir and grand fir will die before they exceed 15 inches in diameter. In this situation, the affected stands would remain in the medium-size class for an indefinite period of time. As time progresses forest structure will become more homogenized across the landscape.

Patch Size

Under the no-action alternative patch size will not change.

In summary, under the no-action alternative, without some other form of stand-replacing event, the existing forest composition will continue to trend towards later-seral species. This is due to the root disease susceptibility of later-seral species. These stands will be in an "endless loop" of pockets of root disease induced mortality followed by the filling in of those pockets with new growth of the same root disease susceptible species. In essence, this is a self-perpetuating problem. The seedling/sapling, small- and large-diameter-class dominated stands would continue to decline in numbers of acres. Conversely, the acres of the medium-size class will continue to increase. Without some form of stand-replacing event, the existing patch size will remain static.

Table 7 illustrates the effect selection of this alternative would have upon the resource indicators and their measures.

Table 7. Alternative A resource indicators and measures

Resource Element	Resource Indicator	Measure	(Alternative A)
Species composition	Conversion of dominant species from later to early species	Acres: Number of acres dominated by early-seral species are closer to the HRV	0
Stand structure	Stand Structure closer to that of Historical Range of Variability	Percentage increase or decrease of acres in each stand structure to be closer to the HRV	0
Average patch size	Change in Average Patch size across the project area	Percentage increase or decrease in average patch size	No increase or decrease because no actions are taken

Cumulative Effects

By definition, direct and indirect effects (40 CFR 1508.8) and cumulative effects (40 CFR 1508.7) result from the proposed action, and thus are not germane to the no-action alternative. The no-action alternative provides a point of reference from which to evaluate the action alternatives.

This alternative would result in no activity at this time. Existing conditions, which are inconsistent with the desired conditions for this area, would remain unchanged by management action. The effects of this alternative are measured against those of the proposed action (alternative B).

Alternative B – Proposed Action

Direct and Indirect Effects

The treatment activities proposed under alternative B are designed and intended to create conditions favorable to the establishment or continuance of:

- Stands of western white pine and western larch and existing stands where ponderosa pine is a dominant.
- Increase the number of acres considered as stand initiation (seedling sapling) structure class to create more diversity in age class.
- Increased overall patch size of forest openings.

It is anticipated that the treatment activities will remove much of the later-seral species in the treated areas. Table 8 shows the estimated acres and proportions of dominance types following implementation alternative B. The existing proportions of the project area by dominance type are provided to facilitate direct comparison between alternatives A and B.

Table 8. Alternative B existing versus post-treatment species dominance group percentages and acres for the project area

Dominance Group Composition	White Pine	Western Larch	Ponderosa Pine	Grand Fir/Western Hemlock/ Western Red Cedar	Douglas Fir	Lodgepole Pine	Subalpine fir/Mix
DG acres pre-treatment percentages/[acres]	N/A [N/A[1]]	N/A [N/A[1]]	0.4% [22]	65.8% [3,326]	7.3% [368]	24.2% [1,221]	2.2% [111]
DG acres post-treatment percentages/[acres][2]	13.6% [688]	20.4% [1,031]	0.4% [22]	44.2% [2,231]	4.4% [223]	14.9% [754]	1.9% [99]

1. None of the existing stands in the project area are considered western white pine or western larch dominated.
2. 24 percent of the project area is not covered by stand exams. Calculated dominance group and structural size class acres for the project area were increased by 24 percent in each size class to account for this lacking data.

Forest Composition

The proposed combination of regeneration harvest, prescribed fire, and reforestation in alternative B would increase the area dominated by desirable long-lived, seral-tree species within treated stands and collectively across the analysis area.

Existing desirable species composition would be preserved within treatment units. Leave trees would include healthy western white pine, western larch (>25 percent crown ratio) and ponderosa pine and trees that have survived past fires. Removing trees competing with these desirable stand components would improve their vigor and encourage their future growth. The largest trees of other species would be left for snag recruitment and coarse woody debris.

Blister-rust-resistant western white pine and western larch seedlings would be planted following harvest and site preparation in regeneration treatment areas. Artificial regeneration would allow multiple benefits to be derived from gains that have been made in tree improvement. To date the development of rust-resistant white pine seedlings is in the F2 generation. When compared to natural regeneration, the expected gain in rust resistance when planting F2 generation seedlings is approximately 20 percent (Mahalovich 2010)[4.] Deployment of this rust-resistant genetic material is critical to restoring health and vigor to white pine ecosystems (Fins et al. 2002). Planted larch would be of improved stock, and would likely exhibit increased growth rates relative to those naturally regenerated (Fins and Moore 1984).

Coniferous natural regeneration, including western white pine, western larch, ponderosa pine, grand fir, Douglas-fir, western hemlock, lodgepole pine, and western red-cedar, is expected within regeneration treatment areas. Prescribed burning (following harvest) would further act to rejuvenate fire-adapted, early-seral conifers as well as fire-dependent or opportunistic shrub and hardwood species (Arno and Keane 2000; Smith and Fischer 1997; Sampson et al 1995). All of this within-stand compositional variability would provide increased resilience to insects, diseases, fire and a potentially changing climate[5], as well as providing habitat variety for wildlife and contributing to aesthetic variety.

Across the analysis area, western white pine and western larch dominance-types would increase by 1,719 acres. As also described in table 8 there will be roughly corresponding decreases in grand fir, Douglas-fir, western hemlock, and lodgepole pine cover types.

The primary indirect benefit in the stand regeneration areas comes from the removal of root-disease-prone species and replacing those individuals with species that are resistant to root diseases. This change in species composition will break the current “self-perpetuating loop of root disease mortality.” The new stands will be more stable and have the correct species mix that will enable them to grow larger trees that would last longer than the existing stands.

The forest composition changes affected by the activities proposed in alternative B would enhance forest diversity, and move the dominance groups in the planning area towards the desired future condition. This shift would more closely reflect historic vegetative conditions, increase resilience to disturbance agents, climatic variability and effectively increase future vegetation management options. It would also enhance the variety of habitat available to wildlife and increase the available range of future vegetation management options.

Forest Structure

Stand structures on the 1,719 acres of proposed regeneration treatment in alternative B would be converted from their existing small- and medium-size classes back to the seedling/sapling class. This will effectively add 1,719 acres to the seed/sap class which is currently deficit moving the project area closer to the desired condition for forest structure. These 1,719 acres will have reduced fuel loading, lower canopy density, and reduced horizontal and vertical fuel continuity relative to existing stand structures. Among other benefits, these changes in fuel characteristics would result in less intense fire behavior and make a fire easier to control (see Fire and Fuels specialist report). At the planning area level, the most noteworthy structural change that would result from the proposed activities is the 34 percent (1,719 acre) increase of early-seral successional forest structures (table 9). Corresponding to this change would be a 34 percent decrease in the amount of small- and medium-sized forest structure from 76 percent of the analysis area to 42 percent. Alternative B would have no effect on old-growth.

[4] The anticipated 20 percent gain is calculated when resistance is averaged across multiple management regimes and land ownerships.
[5] Western white pine individuals have one of the largest elevation band tolerances of any conifer species (Hines 2013).

Table 9. Alternative B existing versus post-treatment forest structure acres and percentages by size class for the project area

	Seed/Sap Size Class <5" Average Diameter		Small Size Class 5–10" Average Diameter		Medium Size Class 10–15" Average Diameter		Large Size Class >15" Average Diameter	
Pre Treatment	N/A	N/A	295	5.8%	3,556	70.4%	1,197	23.7%
Post Treatment[1]	1,719	34%	109	2.2%	2,051	40.6%	1,170	23.1%

In addition to the retention of individual trees, leave areas of diverse shapes and sizes would be retained both within, and between regeneration harvest units. These leave areas would not be limited to riparian habitat conservation areas, they would be centered on existing concentrations of large trees, large coarse woody debris, snags, seeps, rock outcroppings or other unique structural and/or habitat features. These areas would include representation of all tree species that are present in the pre-harvest stand. Retention of individual trees and untreated areas would promote the diversity of the early-successional stands that would become established (Franklin and Johnson 2011) and would provide continuity in structural, functional, and compositional elements from the pre-harvest to the post-harvest forest (Gustafsson et al. 2012).

Within regeneration areas, the use of prescribed fire following harvest would create snags from both individual leave trees and within leave areas. Reinhardt and Ryan (1988) produced nomograms to predict fire-caused damage and mortality to Douglas-fir and other conifer species native to the project area. These refined nomograms, which have been incorporated into FVS, are used to help determine the set of environmental and fuel thresholds[6] needed to predict acceptable/desired levels of tree mortality from the prescribed broadcast burning.

Patch Size

As can be seen in table 10, regenerating large patches of existing forest structure and converting them to the early successional stage of stand development will increase the mean patch size[7]. This larger mean patch size for the early successional stage represents a move towards desired conditions in the planning area and towards the historic range of structural distribution at the landscape scale. This follows the recommendation from the St. Joe Geographic Assessment (USDA Forest Service 1997) to restore large-scale diversity in landscape pattern by increasing patch size of both early and late successional patches; while providing for a large variety of patch sizes.

Table 10. Alternative B effects on patch size range and average acres

Number of Stands		Stand Acre Range	Average Stand Acres
Pre-Treatment	113	3.5–83 acres	15.2 acres
Post-Treatment	54	5–578 acres	31.8 acres

Table 11 shows the amount of change that can be expected from implementation of the proposed regeneration treatments under this alternative. Implementation of this alternative would promote the desired species/structure and range of patch sizes across the project area. Barring a stand-replacing event in the treated areas, these treatments will increase the future acreage of mature forest containing long-lived seral species.

[6] Prescribed burn prescription parameters.
[7] Analysis completed using GIS estimates of patch size pre- and post-treatment.

Table 11. Direct and indirect effects upon resource indicators and measures for alternative B

Resource Element	Resource Indicator	Measure	Alternative B Direct/Indirect Effects
Species composition	Conversion of dominant species from later to early species	Acres: Number of acres of NFS land in the project area dominated by early-seral species are closer to the HRV	Increase of 1,719 acres; or 34 percent, in species composition converted to early-seral dominance group
Stand structure	Stand structure closer to that of historical range of variability	Acres: Percentages of acres of NFS land in the project area in each stand structure are closer to the HRV	Increase of 1,719 acres; or 34 percent, in the seed/sap structural group with a corresponding decrease from both the small and medium structural classes
Average patch size	Change in average patch size across the project area	Percent change in average patch size on NFS land in the project area Percent increase or decrease in average the patch size	Average patch size across the project area increases 109 percent

Under alternative B; the increases in the numbers of early-seral species and amount of acres in the early-structural stage, as well as the both the amount and size of early-seral patches, desirable within-stand structural elements (particularly existing large trees) would be maintained. Desirable individual leave trees are healthy western white pine, western larch and ponderosa pine, and, where appropriate, other later-seral, fire-surviving relic trees. In the limited areas within regeneration units with concentrations of healthy desirable leave trees, this would effectively result in a thinning. Removing trees that are competing with these desirable stand components would “release” them to grow and increase in vigor. Over time, these ever-larger trees would provide a source of large snags and eventually coarse woody debris. Over the planning horizon of 60 years the project area will be enhanced by the proposed vegetation treatments in ways that meets management objectives previously discussed.

Cumulative Effects

The cumulative effects analysis discusses cumulative effects as changes in the existing condition due to past, present, and future activities, including the effects of the alternative. Past activities are what have created the existing condition. As such the effect of these past activities is described in the existing condition of this document.

We considered the effects of the cumulative actions described in the proposed action as well as future planned projects (in which there is none planned for the project area). The past regeneration harvesting that established western larch, rust resistant white pine and pre-commercial thinning and pruning that maintained larch and white pine, in combination with the proposed activities, would move the conditions of the forest vegetation within the project area closer to the desired future condition. The proposed action would reduce, mitigate and slow the spread of insect damage and disease within stands. It has been determined that none of the effects of these actions would adversely impact the effects on forest composition, forest structure, or patch size caused by the proposed action.

Degree to Which the Purpose and Need for Action is Met

Management direction for the IPNF clearly outlines the need to reduce the number of acres that can be classified as either small- or medium-stand structure. Direction further guides us to manage for larger stands that are dominated by early-seral species such as western white pine, western larch, and ponderosa pine. Table 12 shows how well alternatives in this project meet these directions.

Alternative A does nothing to satisfy management objectives and leaves the project area in its current condition.

Alternative B fulfills all of the silvicultural management objectives for the project and does that to a greater degree than the other alternative.

Table 12. Summary comparison of how the alternatives address the purpose and need

Purpose and Need	Resource Indicator	Measure	Alternative A	Alternative B
Species composition	Conversion of dominant species from later to early species	Acres: Number of acres dominated by early-seral species are closer to the HRV	0	1,719
Stand structure	Stand structure closer to that of historical range of variability	Acres: in seedling/ sapling stand structure are closer to the HRV	0	1,719
Average patch size	Change in average patch size across the project area	Percent increase or decrease in average the patch size	No change	Increase of 109%

Regulatory Framework

The proposed action has been reviewed and is determined to be in compliance with the management framework applicable to this resource. The laws, regulations, policies and Forest Plan direction applicable to this project and this resource are as follows.

Laws, Regulations, and Policies

Regulatory constraints applying to the management of forest vegetation include the State Forest Practices Acts, Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), National Forest Management Act of 1976 (NFMA), Idaho Panhandle National Forests Forest Plan (USDA Forest Service 1987) and Forest Service policy[8].

- The 1974 RPA states, “It is the policy of Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans.”
- The 1976 National Forest Management Act directs that Forest Plans will be developed which specify guidelines to identify the suitability of lands for resource management; provide for the diversity of plant and animal communities based on the suitability and capability of land areas to meet multiple-use objectives; where appropriate, to the degree practicable, preserve the diversity of tree species similar to that existing in the planning area; insure that timber will be harvested from National Forest

[8] Listed laws/regulations/policies are a synopsis of pertinent areas of compliance and are not meant to be a completely inclusive list.

System … and the harvesting system used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber.

- Any cut designed to regenerate an even-aged stand of timber must be determined to be appropriate to meet the objectives and requirements of the land management plan and, in the case of clearcutting, is the optimum method; has had an interdisciplinary review of impacts and the cuts are consistent with the multiple use of the general area; will be shaped and blended, to the extent practicable, with the natural terrain; meets established, suitable size limits; and is carried out in a manner consistent with protection of soil, watershed, fish, wildlife, recreation, esthetic resources, and the regeneration of the timber resource.
- NFMA amended RPA and requires that stands of trees shall generally have reached the culmination of mean annual increment of growth prior to harvest, but this does not preclude the use of sound silvicultural systems such as thinning and other stand improvement measures; it also allows salvage or sanitation harvest following fire, windthrow, or other catastrophe or within stands in imminent danger of insect and disease attack.

Forest Service policy directs land managers to:

- Use only those silvicultural practices that are best suited to the land management objectives for the area. Consider all resources, as directed in the appropriate forest plan.
- Before scheduling stands for regeneration harvest, ensure, based on literature, research, or local experience, that stands to be managed for timber production can be adequately restocked within 5 years of final harvest. Five years after final harvest means 5 years after clearcutting, final overstory removal in shelterwood cutting, the seed tree removal cut in seed tree cutting or after selection cutting.

Forest Service policy further directs that:

- The size of tree openings created by even-aged silvicultural methods will normally be 40 acres or less. With some exceptions, creation of larger openings will require public review and regional forester approval.
- Timber management activities will be the primary process used to minimize the hazards of insects and diseases and will be accomplished primarily by maintaining stand vigor and diversity of plant communities and tree species.
- Protection of timber stands from insect and disease problems would involve the silvicultural treatments prescribed for timber management activities.
- Proposed activities will be consistent with management area objectives. Descriptions and objectives of these management areas are included in the Forest Plan.

Idaho Panhandle National Forests Forest Plan Monitoring Report (USDA 2010) documents the IPNF’s record of restocking harvested lands, determining timberland suitability, and following regional guidelines regarding public notification, environmental analysis and approval of openings greater than 40 acres created by even-aged silvicultural systems. This monitoring report also serves to summarize and document the level of ongoing insect and disease hazard, the steady decrease of acres treated and the corresponding timber volume sold on the IPNF over the past 10 years.

Forest Plan Direction and Demonstrated Compliance for Silviculture

The 2015 Forest Plan provides silviculture standards and guidelines, goals, desired conditions and objectives that apply to the Brebner Flat Project. Each is listed on the following pages and a description of how this project complies and follows each of these items.

Table 13. Compliance with Forest Plan standards

Standards	Description
Vegetation	
FW-STD-VEG-01	**Within old growth stands, timber harvest or other vegetation management activities shall not be authorized if the activities would likely modify the characteristics of the stand to the extent that the stand would no longer meet the definition of old growth (see glossary for old growth definition).** *Response:* None of the areas identified for treatment are classified as old growth. This was based on analysis of stand exam data and by silviculturist walk-throughs of all stands proposed for treatment.
FW-STD-VEG-02	**Within the ancient cedar groves, timber harvest or other vegetation management activities shall not be authorized (exceptions may occur for the treatment of non-native invasive plants, activities needed to address human health and safety issues, such as the removal of hazard trees adjacent to a recreation site, or in the circumstance where a natural, unplanned ignition is allowed to burn into a grove under a low intensity).** Response: Not applicable to the project because there are no ancient cedar groves present within or adjacent to the project.
FW-STD-TBR-01	**Regulated timber harvest activities shall occur only on those lands classified as suitable for timber production.** *Response:* Alternative A complies because it does not propose timber harvest. Alternative B complies because all lands proposed for timber harvest are suitable timber lands[9].
FW-STD-TBR-02	**If individual harvest openings created by even-aged silvicultural practices are proposed that would exceed 40 acres, then NFMA requirements regarding public notification and approval shall be followed. These requirements do not apply to the size of areas harvested because of catastrophes such as, but not limited to, wildfire, insect and disease attacks, or wind storms.** Response: Alternative B does include even-aged silvicultural practices. Only Alternative B contains openings greater than 40 acres. Openings in Alternative B in excess of 40 acres were disclosed to the public. The public comment period for this environmental assessment provided opportunity for public comment regarding openings in excess of 40 acres. The openings that are expected to exceed 40 acres are discussed in detail in this report. Regional Forester approval will be sought in order to follow through with the creation of the proposed large openings.

[9] A portion of Units 25a, 26b_2 and 19b_1 were originally mapped as being unsuitable for timber production. Subsequent stand exams and walk-throughs of that area by certified silviculturists' field verified that the area was suitable for timber production.

FW-STD-TBR-03	**Timber harvest activities shall only be used when there is reasonable assurance of restocking within 5 years after final regeneration harvest. Restocking level is prescribed in a site-specific silviculture prescription for a project treatment unit and is determined to be adequate depending on the objectives and desired conditions for the Plan area. In some instances, such as when lands are harvested to create openings for fuel breaks, wildlife habitat, and vistas or to prevent encroaching trees, it is adequate not to restock.** *Response:* This standard does not apply to Alternative A because it does not propose even-aged silvicultural practices. Alternative B does comply with this standard because regeneration harvests are not proposed on sites with potential regeneration success concerns. Overall regeneration success on the St Joe Ranger District is 90 percent for the period 1990 to 1999, with 88 percent success within 5 years of regeneration harvest (FV-02). The 2007-2009 Forest Plan Monitoring and Evaluation Report (USDA, 2010, page 12; PF Doc. CR-040) states, "…it appears that 98% of the stands planted in the last 21 years are currently satisfactorily stocked.
FW-STD-TBR-04	**Even-aged stands shall generally have reached or surpassed culmination of mean annual increment (95 percent of CMAI, as measured by cubic volume) prior to regeneration harvest, unless the following conditions have been identified during project development:** • **When such harvesting would assist in reducing fire hazard within the WUI;** • **When harvesting of stands will trend landscapes toward vegetation desired conditions.** Response: The stands proposed for regeneration harvests have not yet met CMAI. Inclusion of these stands is intended to increase the amount of seedling/sapling size class and western white pine/western larch forest types while decreasing the grand fir/hemlock forest type and small/ medium size classes. This would trend these measures of forest resilience on the landscape within the project area toward the desired conditions as directed by the Forest Plan. These stands are currently stocked primarily with grand fir and lodgepole pine. Current species compositions in combination with the documented root disease activities give these stands elevated probability of early culmination. The grand fir and Douglas-fir have already begun to decline due to root disease infections and stand examinations indicated signs of root disease are widely present throughout the stands.
FW-STD-TBR-05	**Harvesting systems shall be selected based on their ability to meet desired conditions and not strictly on their ability to provide the greatest dollar return.** *Response:* Alternative A complies because it does not propose timber harvest. Alternative B complies with this guideline. The prescriptions called for leave all healthy early seral species as leave trees even when there are numbers greater than the minimums called for. Additionally, when there are insufficient numbers of early seral species leave healthy later seral species if insufficient quantities of desired leave species are not present on site.
FW-STD-TBR-06	**Clearcutting shall be used only where it is the optimum method for meeting Forest Plan direction.** *Response:* Alternative A complies because it does not propose clearcutting. Alternative B meets this standard because clearcutting with reserves is proposed only on severely diseased sites. Clearcutting with reserves followed by planting is the optimum method for meeting Forest Plan direction given existing site conditions and species composition.

FW-STD-TBR-07	**Even-aged prescriptions other than clearcutting (seed tree, shelterwood, etc.) shall be used when appropriate to meet Forest Plan direction.** Response: Alternative A complies because it does not propose timber harvest. These other even-aged prescriptions: seed tree or shelterwood are prescribed where enough desirable early seral species exist.
MA6-STD-TBR-01	**On lands suitable for timber production, timber harvest is allowed for the purpose of timber growth and yield while maintaining productive capacity. Timber harvest is scheduled and contributes to the allowable sale quantity.** Response: All proposed activities occur on suitable lands.
MA6-STD-TBR-02	**On lands not suitable for timber production, timber harvest is allowed to meet specific resource objectives other than timber growth and yield. Timber harvest is not scheduled and does not contribute towards the allowable sale quantity.** Response: No proposed treatments that harvest timber are scheduled on unsuitable lands.

Table 14. Compliance with Forest Plan guidelines

Guidelines	Description
Vegetation	
FW-GDL-VEG-01	**Timber harvest or other vegetation management activities may be authorized in old-growth stands if the activities are designed to increase the resistance and resiliency of the stand to disturbances or stressors, and if the activities are not likely to modify stand characteristics to the extent that the stand would no longer meet the definition of old growth (see the glossary for the definitions of resistance and resilience).** *Response:* None of the areas identified for treatment are classified as old growth. This was based on analysis of stand exam data and by silviculturist walk-throughs of all stands proposed for treatment.
FW-GDL-VEG-02	**Road construction (permanent or temporary) or other developments should generally be avoided in old-growth stands unless access is needed to implement vegetation management activities for the purpose of increasing the resistance and resilience of the stands to disturbances.** *Response:* There is no new or temporary road construction or other developments planned in old-growth stands.
FW-GDL-VEG-03	**Vegetation management activities should retain the amounts of coarse woody debris (including logs) that are displayed in table 3 (Forest Plan, page 19–20). A variety of species, sizes, and decay stages should be retained. Exceptions may occur in areas where a site-specific analysis indicates that leaving the quantities listed in the table would create an unacceptable fire hazard to private property, people, or sensitive natural or historical resources. In addition, exceptions may occur where the minimum quantities listed in the table are not available for retention.** *Response:* Prescribed treatments meet Forest Plan guidelines for coarse woody debris, post-treatment.

Guidelines	Description
FW-GDL-VEG-04	**Vegetation management activities should retain snags greater than 20 inches DBH and at least the minimum number of snags and live trees (for future snags). Where snag numbers do not exist to meet the recommended ranges, the difference would be made up with live replacement trees. Exceptions occur for issues such as human safety and instances where the minimum numbers are not present prior to the management activities.** *Response:* Prescribed treatments meet Forest Plan guidelines for snags and green-tree-replacement snags, post-treatment.
FW-GDL-VEG-05	**Where vegetation management activities occur and snags (or live trees for future snags) are retained, the following direction should be followed:** **Group snags where possible** **Retain snags far enough away from roads or other areas open to public access to reduce the potential for removal (generally more than 150 feet)** **Emphasize retention of the largest snags and live trees as well as those species that tend to be the most persistent, such as ponderosa pine, larch, and cedar** **Favor snags or live trees with existing cavities or evidence of use by woodpeckers or other wildlife** *Response:* Prescribed treatments will, where possible, meet FW-GDL-VEG-05 Forest Plan guidelines, post-treatment.
FW-GDL-VEG-06	**During vegetation management activities (e.g., timber harvest), and in the event that retained snags (or live trees being retained for future snags) fall over or are felled (for safety concerns), they should be left on site to provide coarse woody debris.** *Response:* Prescribed treatments will, where possible meet FW-GDL-VEG-06 Forest Plan guidelines, post-treatment.
FW-GDL-VEG-07	**Evaluate proposed management activities and project areas for the presence of occupied or suitable habitat for any plant species listed under the Endangered Species Act or on the regional sensitive species list. If needed, based on pre-field review, conduct field surveys and provide mitigation or protection to maintain occurrences or habitats that are important for species sustainability.** *Response:* See Botany Report
FW-GDL-VEG-08	**All silvicultural practices may be used to manage forest vegetation. This includes silvicultural systems (e.g., even-aged, two-aged or uneven-aged), regeneration methods (e.g., clearcutting, seed-tree, shelterwood, and group or single-tree selection), as well as other practices such as improvement cutting, commercial or pre-commercial thinning, use of planned or unplanned ignitions, planting, pruning, invasive terrestrial plant species control, cone collection, tree improvement, insect or disease control, site-preparation, and fuel reduction. Appropriate practices for a given situation depend on numerous factors, including the current and desired forest vegetation conditions at the stand and landscape scales, the biophysical setting, and the management direction and emphasis for the area. Silvicultural practices should generally trend the forest vegetation towards conditions that are more resistant and resilient to disturbances and stressors, including climate change.** *Response:* The silvicultural practices and systems prescribed for treatment are appropriate for the site-specific situations where they are being applied. The silvicultural practices and systems prescribed trend the forest vegetation composition, structure and function towards conditions that are more resistant and resilient to disturbances and stressors, including climate change.

Table 15. Compliance with Forest Plan goals

Goal	Description
GOAL-VEG-01	**Plant communities are trending toward the desired conditions for composition, structure, patterns, and processes. The ecological integrity of the communities is high and they exhibit resistance and resiliency to natural and man-caused disturbances and stressors, including climate change.** *Response:* Restoring some of the existing later seral species dominated stands in the project area to early-seral-species-dominated stands via species and structure conversion is compliant with GOAL-VEG-01.

Table 16. Compliance with Forest Plan desired condition

Desired Condition	Description
VEGETATION	
FW-DC-VEG-01	**The composition of the Forest is within the desired ranges for the dominance groups illustrated in Figure 2. More of the Forest is dominated by white pine, ponderosa pine, larch, and whitebark pine. Conversely, less of the forest is dominated by grand fir, western hemlock, western red cedar, Douglas-fir, lodgepole pine, and subalpine fir.** *Response:* Prescriptions specifically target later-seral species for removal and retention and regeneration of early-seral species. Conversion of units from late-seral-species dominance to early-seral-species domination trends the Forest towards this desired condition.
FW-DC-VEG-02	**The structure of the forest is within the desired ranges for the size classes illustrated in Figure 2. More of the Forest is dominated by stands occurring in the seedling/sapling-size class and less of the forest is dominated by stands that occur in the small- and medium-size classes.** *Response:* Implementation of the prescribed treatment will trend the Forest towards this desired condition for Forest structures by increasing the amount of stands in the seedling/sapling-size class and reducing the amount of stands in the small and medium-size classes.
FW-DC-VEG-03	**The amount of old growth increases at the Forest-wide scale. At the finer scale of the biophysical setting, old growth amounts increase for the Warm/Dry and Warm/Moist settings while staying close to the current level for the Subalpine setting. Relative to other tree species, there is a greater increase in old-growth stands that contain substantial amounts (i.e., 30% or more of the total species composition) of one or more of the following tree species: ponderosa pine, larch, white pine, and whitebark pine. Old-growth stands are more resistant and resilient to disturbances and stressors such as wildfires, droughts, insects and disease, and potential climate change effects. The size of old-growth stands (or patches of multiple contiguous old-growth stands) increase and they are well-distributed across the five geographic areas on the Forest.** *Response:* Implementation of this project will not increase old growth on the Forest or in the Warm/Dry or Warm/Moist biophysical settings.
FW-DC-VEG-04	**Tree densities and the number of canopy layers within stands are generally decreased.** *Response:* Implementation of all prescription treatments will trend the Forest towards this desired condition by reducing tree densities and number of canopy layers.

Desired Condition	Description
FW-DC-VEG-05	**The pattern of forest conditions across the landscapes consists of a range of patch sizes that have a diversity of successional stages, densities, and compositions. Formerly extensive, homogenous patches of Forests that are dominated by species and size classes that are very susceptible to disturbance agents have been diversified. Generally, there is an increase in the size of Forest patches that are dominated by trees in the seedling/sapling-size class, as well as in the large-size class. There is a decrease in the size of the patches that are dominated by trees in the small- and medium-size classes.** *Response:* The proposed action calls for the creation of larger size patches (>40 acres) that are dominated by white pine, larch and other early-seral species.
FW-DC-VEG-06	**Root disease fungi, such as *Armillaria* and *Phellinus*, are killing fewer trees as the composition of the Forest trends toward less susceptible tree species such as larch, ponderosa pine, and white pine. Forest insects, such as Douglas-fir bark beetle, mountain and western pine beetles, fir engraver beetle, and the western spruce budworm, are generally causing less tree mortality. Impacts from the non-native fungus that causes the white pine blister rust disease are reduced as the abundance of rust-resistant white pine and whitebark pine increases.** *Response:* In all of the proposed units, the number of individuals of species that are highly susceptible to root disease will be removed in favor of less susceptible species.
FW-DC-VEG-11	**The desired Forest composition, structure, and pattern for each biophysical setting are described below:** **Warm/Moist: This biophysical setting includes moist Forest sites that are relatively warm. This setting includes low-elevation upland sites with deeper soils on north and east aspects, extensive mid-elevation moist upland sites, and most low- and mid-elevation wet stream bottoms, riparian benches, and toe-slopes. The desired and current condition for dominance groups and size class are displayed in figure 6 and figure 7 (Forest Plan, pages 16–17), respectively**. *Response:* Prescribed treatments trend the desired condition for the Warm Dry and Warm/Moist biophysical settings.
MA6-DC-TBR-01	**Timber production occurs on suitable lands within this MA.** *Response:* All proposed treatments within this MA occur on lands suitable for timber production.

Table 17. Compliance with Forest Plan objectives

Objective	Description
Vegetation	

FW-OBJ-VEG-01	**Forest Resilience: Over the life of the Plan, the outcome per decade is:** **Increased relative representation of early seral, shade-intolerant, drought- and fire-tolerant, insect/disease-resistant-species dominance types (e.g., ponderosa pine, white pine, larch, whitebark pine, and hardwoods) on approximately 85,000 to 90,000 acres (these acres are also included in those listed in the following bullet).** **Treatment of approximately 250,000 acres to maintain and/or improve forest resilience, natural diversity, and productivity and to reduce negative impacts of non-native organisms. Treatments may include timber harvest, planting, thinning, management of fire (including planned and unplanned ignitions), mechanical fuel treatments, re-vegetation with native species, blister rust pruning, integrated tree improvement activities, non-native invasive plant treatments, and other integrated pest management activities including forest health protection suppression and prevention activities.** *Response:* The proposed action will move the Forest towards this objective by treating approximate 1,719 acres where there will be an increase in early seral species and improved forest resiliency.

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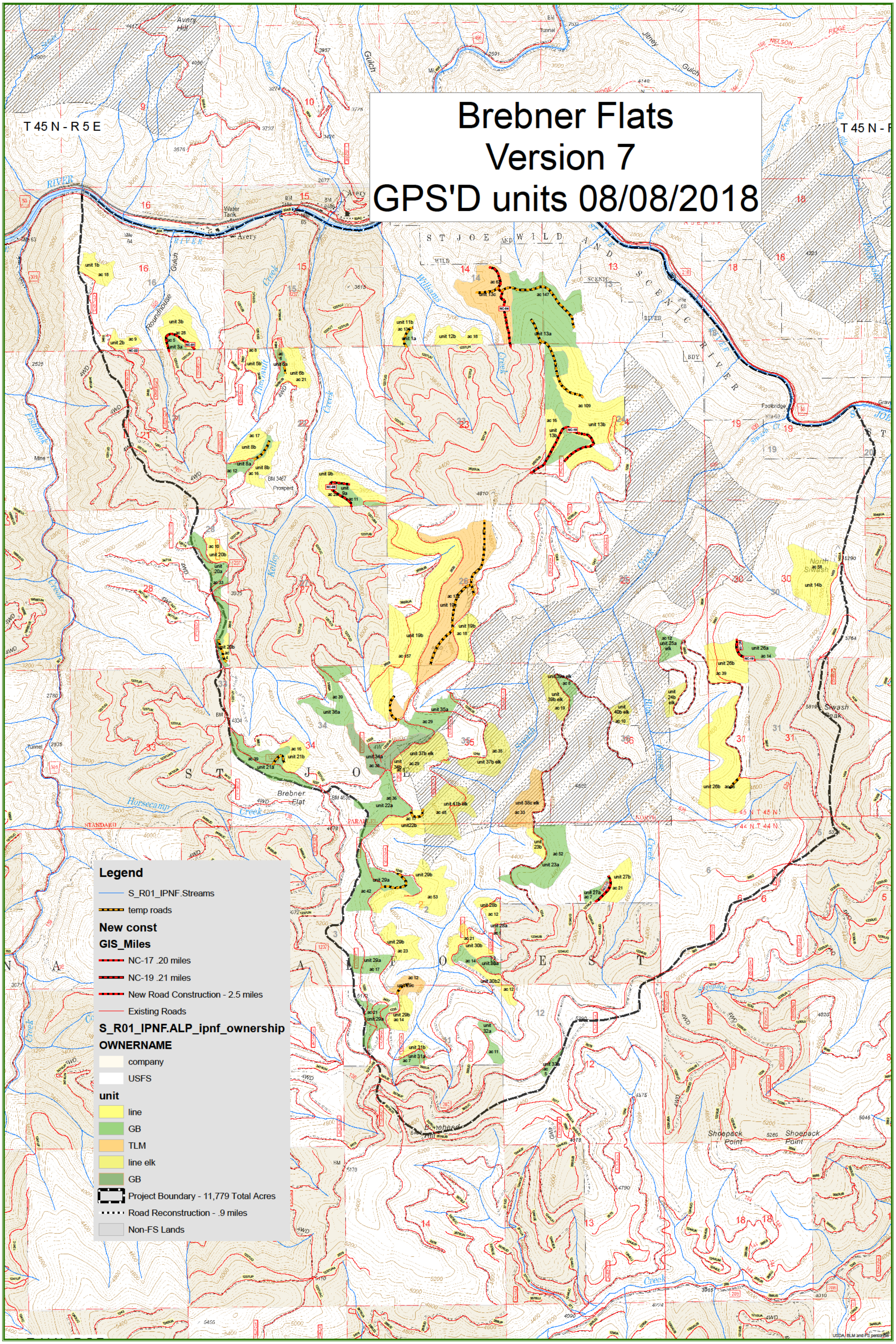
Appendix A: Large Trees, Mistletoe and the Preference of Leave Trees

The following preference for leave trees in stands infected with dwarf mistletoe comes from Schmitt and Hadfield (2009).

> Larch is retained as a highly desirable seral conifer seed source in various regeneration harvest systems. Larch may also be retained where it is a priority remnant species in thinning and selection harvests. Marking guidelines may advise that trees be selected for retention or removal based on level of dwarf mistletoe infection (Beatty and others 1997). Guidelines for larch dwarf mistletoe have followed those of most or all other species of dwarf mistletoe; desirability for leave diminishes with increasing DMR. This recommendation should be revisited.
>
> Desirable severely-infected larch of DMR class 6 and class 5 have infections throughout all or most of their remnant crowns. These trees will invariably have substantially less crown mass than comparable uninfected trees. Thus, they produce fewer and less-viable larch seed, but also less dwarf mistletoe seed than moderately-infected individuals. Severely-infected larch can also be expected to die in the near-term, probably within a decade or two. Trees with DMR 6 and 5, in that order, can be used as replacement snags when alive and standing and snags as soon as they die. For these reasons, they should be retained in harvest units, at least at the density required to meet wildlife resource objectives. If these trees are not needed as snags or down woody material, they should be given a lower priority to retain.
>
> Healthy larch, DMR class 1 and class 2 trees, in that order, should be retained in thinning's and selection removals where larch is a preferred leave tree. Less desirable trees, are DMR class 3 and 4 trees, in that order, since they will live for decades and continue to spread dwarf mistletoe seeds for some of that time.
>
> Where infected trees are to be retained in stands, especially trees that have the potential to spread dwarf mistletoe seeds to understory, clustering these leave trees should be preferred to leaving individual scattered trees throughout the stand, maximizing their exposure and spread potential. Retaining concentrations of infected individuals to meet wildlife needs can also be done while isolating these clusters by utilizing non-host buffers and geographical non-stocked areas to minimize spread. Non-host buffers at least 50' and ideally 75' between clustered infected and healthy understory would be sufficient to eliminate spread by ejected seeds.

Appendix B: Project Area Maps



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Project Boundary - 11,779 Total Acres
Road Reconstruction - .9 miles
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